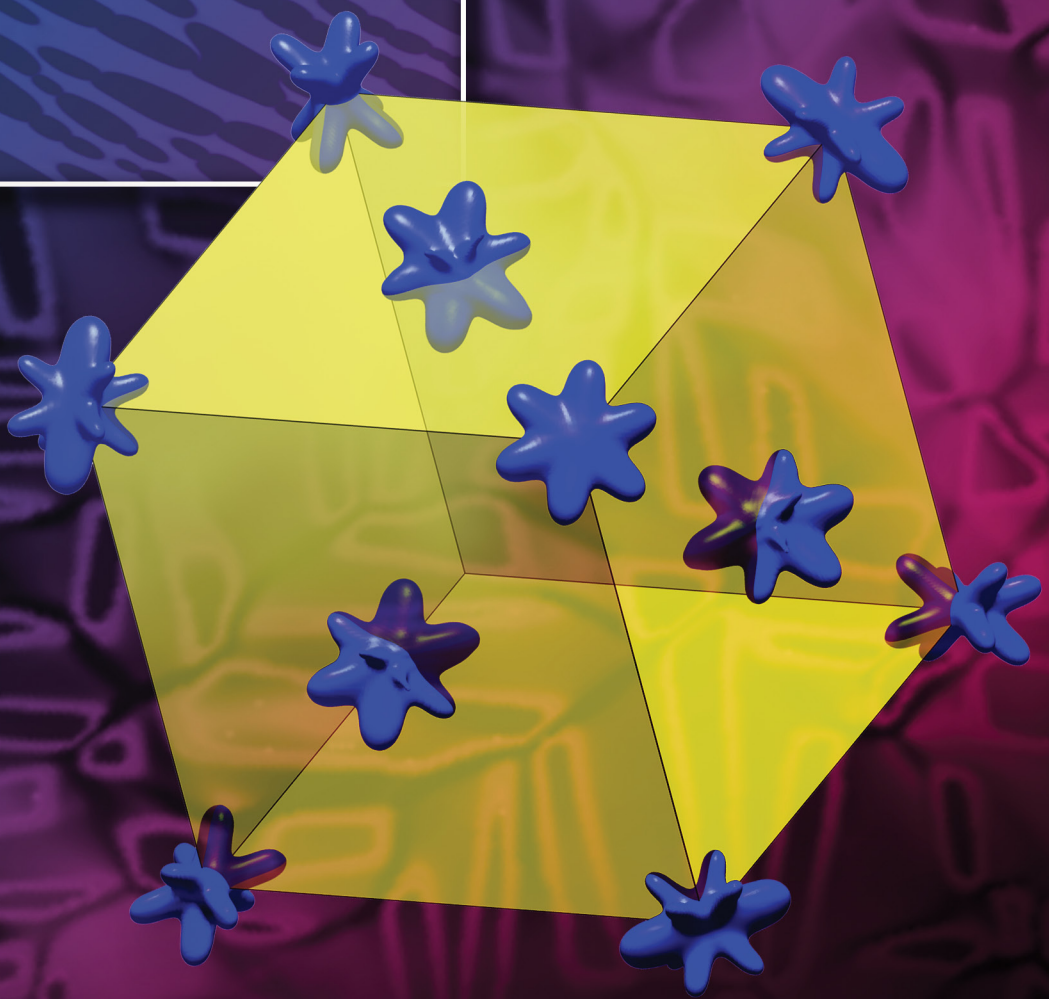
Michigan Tech

MSE Annual Report

Materials Science and Engineering • Michigan Technological University

Fall 2012



www.mse.mtu.edu

Greetings from the Copper Country, Michigan Tech, and the MSE Department!

It is my sincere pleasure to offer these greetings as I begin my first year as department chair. I am fortunate to have inherited a department that is in good shape and moving in great directions. Thanks go to my predecessor, Mark Plichta, for establishing a strong core of excellent faculty, including an impressive group of junior faculty who are on the rise.

My gratitude goes also to alumnus Dr. Franklin St. John '60 for his generous support of the department by way of a chaired professorship that bears his name, and which now will be tied to the departmental chair position. I had an opportunity to meet with Dr. St. John this summer, and he shared his memories of Michigan Tech and many enjoyable stories about his long and productive career that included stints at Pratt & Whitney, Avco Lycoming, and two of his own companies. His gift will have a strong and enduring effect on the future of the MSE department.

In the last MSE newsletter, past chair Mark Plichta challenged readers to support a departmental initiative to incorporate computational predictive tools into the undergraduate curriculum as a means to introduce capabilities in contemporary materials-by-design. This is an ambitious and timely goal; several prominent national initiatives in materials science and engineering have embraced the concept of virtual design to vector experimental efforts and to enable a broader quantification of materials behavior. The response was wonderful and helped establish the physical laboratory, but we are still short of the funds necessary to support ongoing software licensing costs. Please consider supporting this worthwhile campaign again. It is my conviction that this computational initiative, coupled with Michigan Tech's historically excellent materials-processing facilities and our students' enthusiasm (and insistence) for hands-on skill sets, will strategically prepare our graduates for high-impact careers in MSE.

Please stay in touch; I would be pleased to connect, or reconnect, with alumni and friends of MSE. Until we speak again, I wish you well.

Sincere regards,

Stephen Kampe
Franklin St. John Chair
Materials Science and Engineering

Student Scholarships *Pave the Way*

Thirty-two MSE students received more than $77,750 in financial assistance through the University in 2011–12. A large portion of this aid was derived from endowed scholarships that have been established specifically for students pursuing careers in MSE. A partial list of these scholarships and the recipients are given below. Our heartfelt thanks go to our friends, alumni, and their families who have assisted our students through these generous gifts. You, too, can contribute to our students' future successes. Consider including scholarships in your philanthropic endeavors.

Scholarship Fund	Student Recipient, Class
John Biffl Memorial Scholarship	Carol J. Deming, 2012
Nancy E. Borgeson Memorial Scholarship	Jesse R. Dillon, 2012; Kelsey R. Michael, 2013
Professor Gilbert W. Boyd Memorial Scholarship	Kyle J. Deane, 2012
Mr. and Mrs. James C. Clark Memorial Scholarship	Jesse R. Dillon, 2012; Peter A. Enz, 2013; Sara M. Heck, 2012; Nicholas R. W. Weinberg, 2012
Elmer W. Cress Memorial Scholarship	Carolyn J. Lahti, 2013
John Deere MSE Scholarship	Peter A. Enz, 2013
William and Sharon Duca Annual Scholarship	Carol Deming, 2012
Corbin T. Eddy Endowed Scholarship	Shane M. Anderson, 2015
Edwin and Lois Johnson Endowed Scholarship	Thaddeus W. Waterman, 2013
Ladish Company Scholarship	Tyler Botbyl, 2012; Aaron M. Cedergren, 2012; Kyle J. Deane, 2012; Matthew J. Gardeski, 2012; Sara M. Heck, 2012; Michel D. Knudsen, 2013; Nicholas J. Kraft, 2012; Carolyn J. Lahti, 2013; Samantha Leonard, 2012; David M. MacEwen, 2012; Luke M. Operhall, 2013; Mackenzie T. Roeser, 2013; Lance P. Taylor, 2012; Thaddeus W. Waterman, 2013; Nicholas R. W. Weinberg, 2012; Michael P. Wyzlic, 2012
Moses and Mary Levinstein Endowed Scholarship	Sara M. Heck, 2012; Michel D. Knudsen, 2013
Charles Locke Memorial Scholarship	Lance P. Taylor, 2012
Ernest and Miriam Nikkila Scholarship	Bradley J. Pasionek, 2013
Thomas P. Posten Endowed Scholarship	Jesse R. Dillon, 2012
Gary W. Shannette Memorial Scholarship	Stephen K. Greutman, 2015; Kelsey R. Michael, 2013
Dennis and Barbara Staley Endowed Scholarship	Michel D. Knudsen, 2013
Harry Suprinick Memorial Scholarship	Matthew N. Tianen, 2014
James N. Wessell Metallurgical Scholarship	Sara M. Heck, 2012

What's that Sound?

Wind Harp

Brings New Beauty to Campus

There is a new wind harp in the middle of campus, between the Memorial Union and Chemical Sciences buildings. And the sculpture brings aural and visual beauty to the grassy island upon which it sits.

The piece stands more than thirteen feet high, resting on a large boulder, and features a wedge-shaped soundboard covered in mahogany, surrounded by two metallic "petals" opening up around it.

Materials Science and Engineering Professor Mark Plichta has been involved with the wind harp from the beginning, ever since designer Ashok Agarwal came to him for some ideas on soundboard materials.

"We started out considering some metals, such as aluminum, brass, and bronze," Plichta said. "Aluminum was comparatively less costly, but the brass and bronze were expensive."

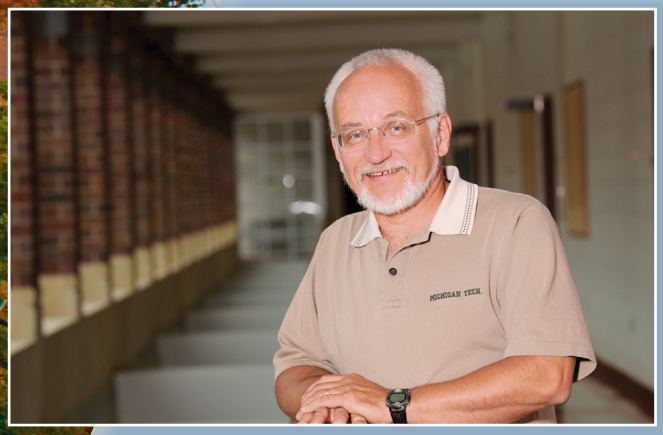
And the sound from all three was not appealing, he said. "The sound was tinny, that is, thin and cold."

They next looked at a high-tech option, in particular, a graphite-fiber-reinforced composite. It was super thin, but . . . "It had too many surfaces," Plichta said, "and that dampened the sound. When you have a lot of interfaces, and this had millions and millions of them, the sound dissipates rapidly."

They sought a more homogenous material next, and wood seemed to be a good choice.

"Although wood has many pores in it, the pores are less effective in dampening the sound," Plichta said. The plethora of wooden stringed instruments speaks to that fact.

Plichta's involvement in the project came about because of guitars. He teaches music in a guitar group, and one of the members, campus gardener, Lynn Watson, told Ashok to seek him out when planning for the wind harp project had begun.



"I'd like to get students involved. . . . have them create their own sound, their own chords, by adjusting the strings."

—Mark Plichta

"Bryan Suits [physics professor and lead flutist in the Keweenaw Symphony Orchestra] helped us, as well," Plichta said. "He and I worked together on the Physics of Music experience for Summer Youth Programs a few years back. He understands sound propagation very well."

Plichta sees teaching moments coming from the wind harp installation, and he's already used sound in his classes to make a point or two.

"We have two bells," he said. "One is made of gray iron, and the other is made of ductile iron. The gray iron sounds like 'dunk.' The other one goes 'ding.' It has an extended ring to it."

It's because of the surfaces, Plichta explains, the graphite in gray iron is shaped more like corn flakes, long and flat, and in the ductile iron the graphite is spherical, that is, small surface area.

And he's got some ideas for beefing up the sound of the wind harp that has sat mostly quiet. Plichta and others have heard its low hum, however.

"We know it can be improved," he said. "We started by making the bridges less massive. We might also consider a hole in the soundboard, like a guitar or violin."

All involved believe the spot is perfect. It was tested for temperature, wind speed, and wind direction for a year before being chosen to house the harp and to determine the best orientation for the soundboard and strings.

"I'd like to see students get involved," Plichta said. "Maybe have them create their own sound, their own chords by adjusting the strings, as well as changing the materials used for the soundboards."

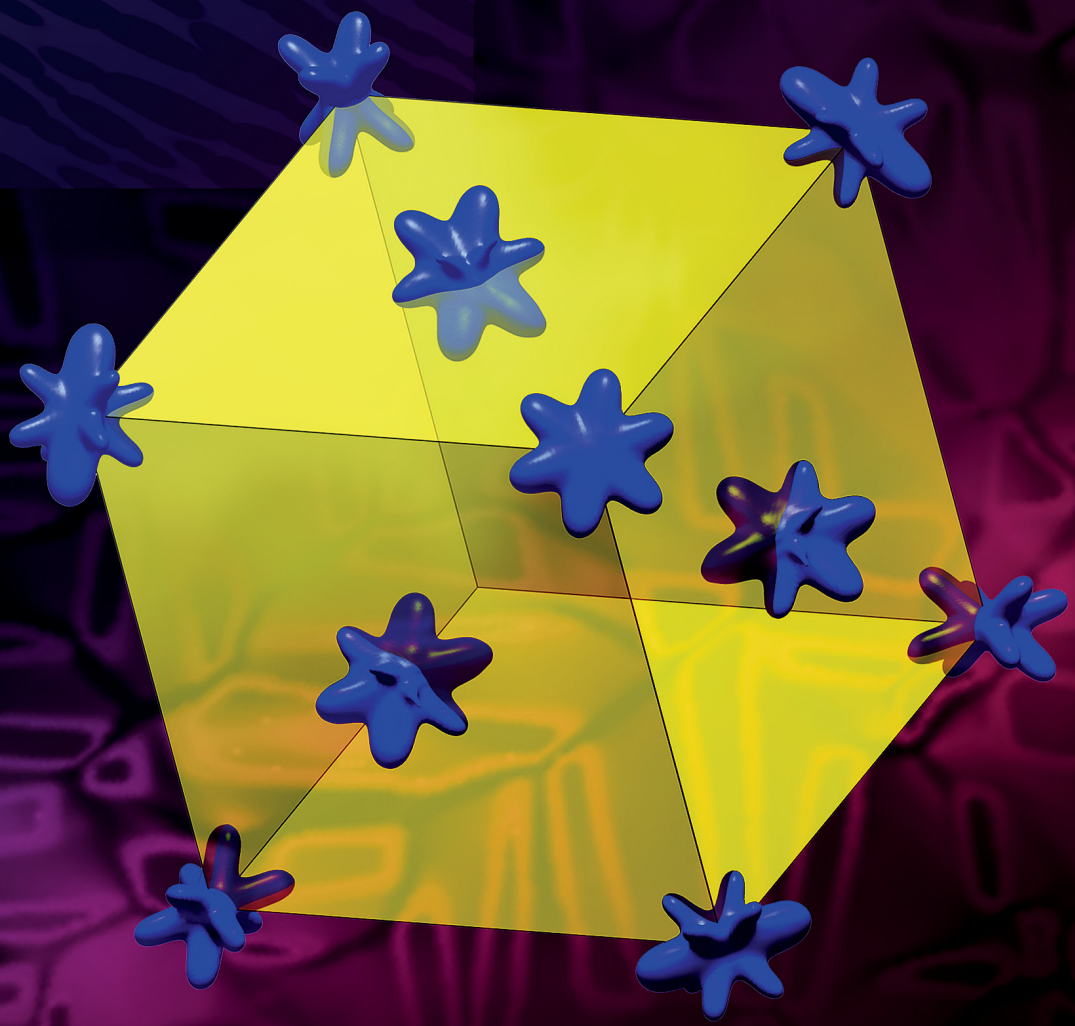
There's also talk of capturing the audio and spreading the sound over the Internet. That way, the harp can be heard all across campus or even the globe.

Yongmei Jin and Yu Wang:

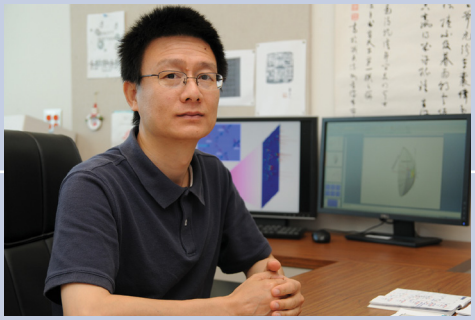
The MSE Dynamic Duo

"It is the support from Michigan Tech and the MSE department that has made this adventure possible."

—Yu Wang



Yongmei Jin



Yu Wang

Assistant Professor Yongmei Jin and Associate Professor Yu Wang are not only colleagues in the Department of Materials Science and Engineering (MSE)—as spouses and parents, they are also collaborators in life.

Jin and Wang go together like magnetic and ferroelectric materials, which happen to be their respective areas of research. Since 2009, when they arrived at the University, they have teamed up on a new endeavor to study crystal disorder and diffuse scattering.

"Yu and Yongmei are world-class scientists, and we are lucky to have both of them," says Stephen Kampe, chair of the department. "They do great work individually and even better work as a team."

The researchers' joint work addresses a fundamental question in materials science: the nature of short-range order in crystals, which is known as "disorder," and its effect on material properties. "Many important properties of crystalline materials are determined by atomic-scale defects," says Wang. Their work will have broad implications for scientific and engineering applications, especially in sensor, actuator, and information technologies, showing the way to improved properties and functionalities.

Jin and Wang focus on chemical and displacement disorders. "In some materials, atoms arrange themselves in an orderly manner over distances much longer than atomic spacing; this is called long-range order," says Jin. "In short-range order, the atoms are less organized, and the atomic order extends only over a few atoms."

"Exotic properties are found in some short-range-ordered materials, signifying new opportunities for materials design," she says. "The challenge is the lack of knowledge of these detailed atomic arrangements, which are difficult to detect. The information hides in diffuse scattering." The goal is to extract this information and identify short-range order and nanoheterogeneities and understand their effects on the properties of materials.

Their roles are complementary: Wang takes the lead in experimentation, studying in-situ, three-dimensional diffuse scattering using synchrotron X-ray diffraction; and Jin employs supercomputers in advanced computational data analysis, using multi-scale modeling and simulation to generate digital characterizations of materials.

Wang and Jin's research takes them to Argonne National Laboratory, where the majority of their experimental work is accomplished. A few times each year, they make the trip to Chicago, with daughters Yvonne, age ten, and Sonia, eight, in tow. There, they do experiments around the clock, literally, with their graduate students. Back on campus, they process the data and build custom devices for the next phase of experimentation; this part of their work is a bit more flexible, comments Jin. She connects remotely to supercomputers located in Austin, Texas, and Oak Ridge, Tennessee, admiring the view of the Portage Canal from her office window.

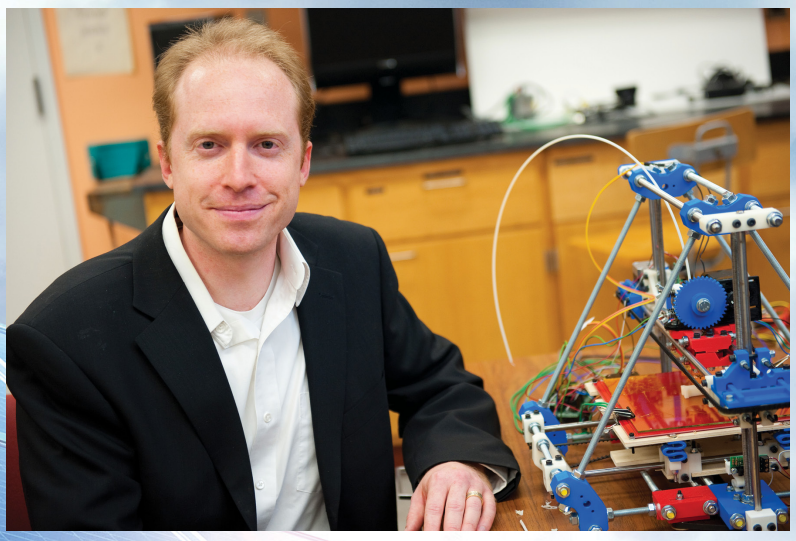
Wang says, "It is the support from Michigan Tech and the MSE department that has made this adventure possible." And Jin adds, "The project has progressed smoothly and is beginning to yield exciting results." She attributes their success to teamwork. "We work hard together, here and at home. We like what we do. The kids understand we're busy, and they can do their own thing on occasion."

The family has adjusted well to the area over the past three years. "Houghton is very beautiful, clean, and quiet," says Jin. "You can enjoy the snow in the winter, because the temperatures are quite mild." Their girls enjoy participating in the Keweenaw's plentiful outdoor activities, including sledding.

During the four years prior to coming to Michigan Tech, the couple held faculty appointments 1,200 miles apart: Wang at Virginia Tech, and Jin at Texas A&M. Wang and Jin joined the MSE faculty in Fall 2009, and their family was reunited.

To Jin, Michigan Tech was a beacon of togetherness. "We were very happy to accept an offer from the University and to move, so we could be together again as a family," she says.

MSE Researcher Creates Better Solar Cells



"They give you the most usable solar energy per square foot of roof space."

—Joshua Pearce

Associate Professor Joshua Pearce has made a solar cell that brings more to the rooftop: it's good at making electricity, and it's great at capturing heat to warm your home and your water. Solar photovoltaic thermal energy systems, or PVTs, generate both heat and electricity, but until now they haven't been very good at the heat-generating part, compared to a stand-alone solar thermal collector. That's because they operate at low temperatures to cool crystalline silicon solar cells, which lets the silicon generate more electricity but isn't a very efficient way to gather heat.

That's an economics problem. Good solar hot-water systems can harvest much more energy than a solar-electric system at a substantially lower cost. And it's also a real estate problem: photovoltaic cells can take up all the space on the roof, leaving little room for thermal applications.

In a pair of studies, Pearce has devised a solution in the form of a better PVT made with a different kind of silicon. His research collaborators are Kunal Girotra from ThinSilicon in California and Michael Pathak and Stephen Harrison from Queen's University, Ontario, Canada.

Most solar panels are made with crystalline silicon, but you can also make solar cells out of amorphous silicon, commonly known as thin-film silicon. They don't create as much electricity, but they are lighter, more flexible, and cheaper. And, because they require much less silicon, they have a greener footprint. Unfortunately, thin-film silicon solar cells are vulnerable to some bad-news physics in the form of the Staebler-Wronski effect.

"That means that their efficiency drops when you expose them to light—pretty much the worst possible effect for a solar cell," Pearce explains, which is one of the reasons thin-film solar panels make up only a small fraction of the market.

However, Pearce and his team found a way to engineer around the Staebler-Wronski effect by incorporating thin-film silicon in a new type of PVT.

You don't have to cool down thin-film silicon to make it work. In fact, Pearce's group discovered that by heating it to solar-thermal operating temperatures, near the boiling point of water, they could make thicker cells that largely overcame the Staebler-Wronski effect. When they applied the thin-film silicon directly to a solar thermal energy collector, they also found that by spike annealing (baking the cell once a day), they boosted the solar cell's electrical efficiency by more than 10 percent.

The symbiotic process solves that real estate problem, making both the thermal and electrical side of the PVT more efficient. "People could have thermal and electrical energy in a neat little package," Pearce said.

Because of that, he speculates that the next wave of solar cells will be PVTs.

"They give you the most usable solar energy per square foot of roof space," Pearce said. "I think that twenty years from now, every roof will be made of integrated PVT."

Pearce has coauthored two articles on this research, "The Effect of Hybrid Photovoltaic Thermal Device Operating Conditions on Intrinsic Layer Thickness Optimization of Hydrogenated Amorphous Silicon Solar Cells," in the journal *Solar Energy;* and "Effects on Amorphous Silicon Photovoltaic Performance from High-Temperature Annealing Pulses in Photovoltaic Thermal Hybrid Devices" in the journal *Solar Energy Materials and Solar Cells*.

Faculty and Staff News

Stephen Kampe, Franklin St. John chair and professor, has been elected a Fellow of ASM International. Kampe was selected "for contributions to the science and technology of functional metal matrix composites and leadership in engineering education."

Miguel Levy, MSE/physics professor, has been named a Fellow of the Optical Society, which brings together scientists, engineers, educators, technicians, and business leaders in the fields of optics and photonics. Levy was recognized for outstanding and fundamental contributions in the areas of magneto-optic and opto-electronic films, and extensions of the theory and applications of magneto-optic photonic crystals.

Professor **Jaroslaw Drelich** has been named editor-in-chief of *Surface Innovations,* an interdisciplinary, international journal that will be launched in February 2013 by ICE Publishing and will concentrate on advances in surfaces and coatings.

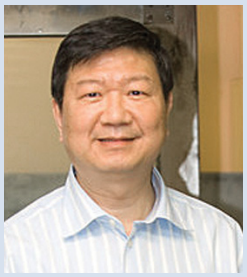
Academic advisor and scientist **Ruth Kramer** received the Clair M. Donovan Award for outstanding service, on behalf of Blue Key Honor Society. Blue Key noted that Kramer's nomination stated that she "not only shows a dedication to postsecondary education but to secondary education as well, by hosting departmental outreach events to excite prospective students and high school teachers about the opportunities Michigan Tech has to offer."

Departmental coordinator **Beth Sickler** received the 2011 Unsung Hero Award through the Michigan Tech Making a Difference Staff Awards. Sickler joined the MSE department in 1996 and has served at Michigan Tech for twenty-eight years. MSE faculty said in nominating her that they "feel privileged to work with someone like Beth who puts service to others above the literal interpretation of the job description."

Senior engineer/scientist **Owen Mills** presented a poster entitled, "Minimize and Equitably Distribute Operating Costs in a Multi-User Environment," at the Microscopy and Microanalysis 2012 Meeting in Phoenix in August. **Susan Hill,** media specialist, was coauthor.

The research of MSE/ECE Associate Professor **Joshua Pearce** on low-cost water purification using solar energy, appeared on National Public Radio and in *Business Insider* and *Treehugger,* along with numerous blogs.

Professor **Yun Hang Hu** was one of only twenty solar energy researchers worldwide to receive an all-expenses-paid trip to the US–Egypt Joint Workshop on Solar Energy Systems and Materials, in Cairo, in March. The workshop was sponsored by the National Science Foundation. The title of Hu's invited talk was "Graphene for Solar Cells."



Professor **Jiann-Yang (Jim) Hwang** received the 2012 EPD Technology Award from TMS for his paper entitled "The Microwave Processing of Electric Arc Furnace Dust." The EPD Technology Award recognizes authors in the field of extraction and processing metallurgy with emphasis on nonferrous metals. Hwang's paper introduces a technology that has the potential to solve the hazardous dust problem and the scrubber sludge problem of a steel mill.

Promotions and Appointments

Congratulations to **Jaroslaw Drelich** and **Yun Hang Hu,** who were both promoted to the rank of professor in August 2012. Drelich has been with the department since 1997 and received his PhD in Metallurgical Engineering from the University of Utah in 1993. Drelich's research focuses on applied surface chemistry, materials processing/recycling/characterization, and interdisciplinary research on biomaterials. Hu joined the department in 2007 and received his PhD in Chemistry from Xiamen University in 1990. Hu's research focuses on hydrogen storage materials, CO2 conversion into novel solid materials, nano-materials for solar energy, and graphene synthesis.

Three new research appointments have been made in the MSE department. **Anjana Asthana** and **Zhiwei Peng '12** have been appointed as research assistant professors, and **Stephen Mashl '95** as research professor.

MSE Involved in Summer Programs

The MSE department has been heavily involved in summer precollege programs for years and there is no sign of letting up, according to **Ed Laitila,** engineer/scientist. "We work with the Women in Engineering (WIE) and Engineering Scholars Program (ESP)," he says. "And we help with the general engineering sessions, too." Ed says the young campers get involved in aluminum and pewter casting, 3-D printing, composites, and blacksmithing. "We cap it off with some ice cream made from liquid nitrogen," Ed says. "That's always a big hit, but, more importantly, they learn about the science behind creating a material."

Updates and Awards

I'm **Allie Glover,** incoming president of Materials United (MU), a student organization designed to expose students to all aspects of MSE. We accomplish this by providing opportunities to meet with fellow students, learn about industry, and introduce students to the major materials professional societies: AFS, ACerS, ASM, TMS, and AIST.

Last year, MU attended the Materials Science & Technology Conference and Exhibition (MS&T) in Columbus, Ohio. At the conference, we went to lectures, networking receptions, and took a trip to ArcelorMittal, a steel coating and processing facility. Later in the year, we stayed active by hosting several popular guest lectures and coordinating outreach programs for local high school science classes. During the high school visits, students were introduced to MSE through fun activities such as making liquid nitrogen ice cream and casting aluminum. A similar outreach event coordinated by MU for first-year college students, the MSE Departmental Open House, was extremely successful at generating about one third of the department's first-year enrollment.

This year, we are excited to travel to Pittsburgh for MS&T, and to once again coordinate the MSE Departmental Open House and high school outreach programs. Along with continuing our past successes, we plan to make MU more accessible to students, alumni, and those in industry through a new website: http://mu.students.mtu.edu. The site will feature articles describing current projects, an events calendar, and even a scholarship database. MU is always looking for support from alumni and industry. To get involved, please feel free to contact me at agglover@mtu.edu or visit **http://mu.students.mtu.edu.**

Thank you from all of us in MU for your continued support as we grow and improve our organization!

Amberlee Haselhuhn (middle right).

Tianle Cheng (left) and Yu Wang.

Andrew H. Baker (right).

PhD candidates **Amberlee Haselhuhn, Tianle Cheng,** and **Andrew Baker** (pictured above) received awards at Michigan Tech's 2012 Graduate Research Colloquium, sponsored by Graduate Student Government and the Graduate School. Haselhuhn received the Graduate Student Service Award for her outstanding contributions to graduate education at Michigan Tech. Cheng received the Outstanding Graduate Student Scholar Award for excelling in academic pursuits. Cheng's advisor, Professor Yu Wang, was awarded Outstanding Graduate Mentor. Baker received second place for his poster "Effect of Melt-Spinning Parameters on the Formation of MnAl6 Quasicrystals."

PhD candidate **Patrick Bowen** received a fellowship from the DeVlieg Foundation, which supports graduate students pursuing research in engineering, wildlife, and biology at Michigan Tech. Bowen's advisor is Jaroslaw Drelich.

PhD candidate **Joseph Licavoli** received the 2012 H. H. Harris Foundation Scholarship, which supports graduate students with outstanding academic performance and who have a professional or academic interest in metallurgy and/or cast metals. Licavoli's advisor is Paul Sanders.

Senior **Alicia Steele** was nominated as the department's 2011–12 "Woman of Promise." The Woman of Promise program recognizes outstanding female students at Michigan Tech. To qualify for this honor, one must have demonstrated academic achievement, campus and community leadership, good citizenship, and creativity.

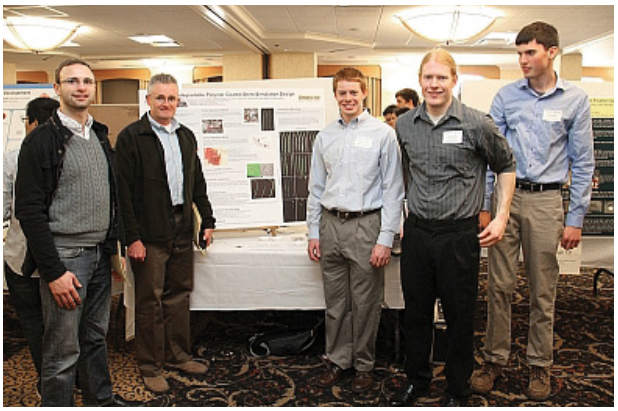
Senior **Thaddeus (Thad) Waterman** was named MSE's 2012 Departmental Scholar.

Front row, left to right: Mike Doll, Michel Knudsen, Sara Heck, Melissa Wright, Dale Goodloe. Back row, left to right: Paul Sanders, Thad Waterman, Kyle Deane, Jesse Dillon, Matt Dazell, Marcel Kerkove, Richard Stewart (president and CEO, Roberts Sinto Corporation and National Director of Region 2, American Foundry Society).

A group of undergraduate students involved in the Advanced Metalworks Enterprise (AME) received scholarships totaling $11,150 from the Foundry Educational Foundation (FEF). The AME, with industry support, provides students with real-world projects in preparation for metal-casting careers and is advised by MSE Assistant Professor Paul Sanders.

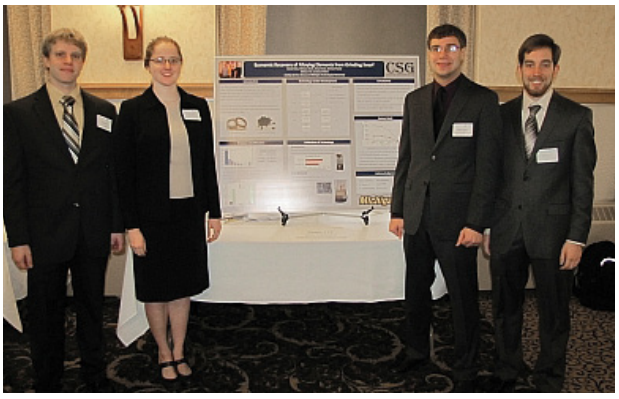
Senior Design and Enterprise Projects

"Bioabsorbable Polymer-Coated Metal Stent Degradation Simulation Design"
Sponsored by Boston Scientific
1st Place
2012 Michigan Tech Undergraduate Expo



Above, left to right: Boston Scientific sponsors Jake Edick and Jon Stinson; Thomas Faulkner (Biomed), David Strobel (Biomed), and Matthew Gardeski (MSE). Not pictured are Kelsey Waugh (MSE) and biomedical engineering students Kristina Price, Brendan Daun, Erin Larson, and Derek Yesmunt. Faculty advisors were Professor Jaroslaw Drelich and Associate Professor Jeremy Goldman; corporate sponsor was Boston Scientific.

"Economic Recovery of Alloying Elements from Grinding Swarf"
Sponsored by Casting Services Group
2nd Place
2012 Michigan Tech Undergraduate Expo



Team members were MSE students (left to right): Daniel Hein, Alicia Steele, Michael Wyzlic, and Nicholas Kraft. Faculty advisor was Professor Jaroslaw Drelich; corporate sponsor was Casting Services Group.

Additional Projects

"Optimize Gray Iron Casting Process to Reduce Distortion during Ferritic Nitrocarburizing"

Senior Design: Trevor Gibson, Carol Deming, Lance Taylor, Nicholas Weinberg

Advisor: Paul Sanders

Sponsor: ThyssenKrupp Waupaca

"Gray Iron Alloy Design to Increase Case Depth during Ferritic Nitrocarburizing"

Advanced Metalworks Enterprise: Ashwin Vekaria, Sara Heck, Melissa Wright, Thad Waterman, Mo Oyervides

Advisor: Paul Sanders

Sponsor: ThyssenKrupp Waupaca

"Creep of Zinc Die-casting Alloys as a Function of Microstructure"

Advanced Metalworks Enterprise: Kyle Deane, Michel Knudsen, Carolyn Lahti, Alex Seidl

Advisor: Paul Sanders

Sponsor: Eastern Alloys Inc.

"Effect of Sn and Mn on the Strength and Toughness of Ductile Iron"

Advanced Metalworks Enterprise: Dale Goodloe, Jesse Dillon, Alex Thiel, Zac Dvorak

Advisor: Paul Sanders

Sponsor: EJ Group

"Fatigue of Stainless Steel Produced by Powder Metallurgy and Hot Isostatic Pressing"

Senior Design: Tyler Botbyl, Samantha Leonard, David MacEwen, Anthony Tuthill

Advisor: Calvin White

Sponsor: EPRI

BREAKING NEWS!

The ASM Materials Foundation, through its Design Competition Committee, selected a Michigan Tech MSE team as second-place winner of its 2012 Undergraduate Design Competition for the project entitled, "Reduction of Residual Stresses in Cast Brake Rotors." Team members included Nick Weinberg, Trevor Gibson, Carol Deming, and Lance Taylor, and team advisor was Paul Sanders. The team received $1,500 plus $500 travel assistance to attend the ASM Leadership Awards Luncheon at the MS&T 2012 Conference and Exhibition in Pittsburgh in October.

Amy Clarke '00 Receives PECASE Award

Left to right: Steven Chu, Secretary of Energy; Amy Clarke; John P. Holdren, President Obama's Science and Technology Advisor.

Amy Clarke '00 received the 2012 Presidential Early Career Award for Scientists and Engineers (PECASE), and the honor included a trip to the White House.

"It was like being in a movie," Clarke said. "We assembled in the East Room of the White House to meet President Obama and have our photo taken. The President addressed us as a group and was very charismatic and charming. He broke the ice by joking that we should all be put on tutor rotation and help his oldest daughter with her homework. After the group photo, he shook each person's hand as they introduced themselves to him. It was definitely an amazing and once-in-a-lifetime experience."

PECASE awards are given to those "who show exceptional promise for leadership at the frontiers of scientific knowledge," according to the White House. In fact, this is the highest honor bestowed by the US government on scientists and engineers who are early in their research careers.

Clarke is a research and development scientist at Los Alamos National Laboratory (LANL) in the materials science and technology—metallurgy group. Her research focuses on materials synthesis and processing to control the microstructure and properties of important materials for energy, defense, and industry. She was nominated by the National Nuclear Security Administration of the Department of Energy.

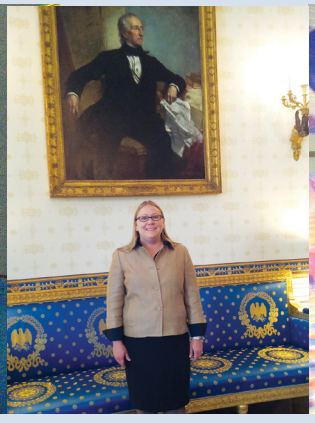
Before the White House meeting, the President's Science and Technology Advisor John Holdren conferred the awards to the ninety-six outstanding researchers in a ceremony at the Smithsonian Institution National Museum of Natural History.

PECASE originated in 1996, when President Clinton commissioned the National Science and Technology Council to establish an award that would recognize young scientists and engineers conducting critical research.

Clarke received her BS degree in Metallurgical and Materials Engineering from Michigan Tech and her MS and PhD degrees in Metallurgical and Materials Engineering from the Colorado School of Mines (CSM). During her graduate studies at CSM, she explored novel thermal-processing strategies creating advanced high-strength steels for the automotive industry. Clarke received the Willy Korf Award for Young Excellence in 2007 for her PhD research.

Of her work, Clarke says, "As a grad student, I explored novel heat-treating and alloying strategies to create advanced high-strength steels for cars to lower weights and improve fuel efficiency and crash worthiness. The physical metallurgy of steel shares many characteristics with those of uranium and uranium alloys. At LANL, I apply my steel metallurgy experience to improve the synthesis and processing, performance, and reliability of uranium and uranium alloys for energy and defense applications."

Clarke joined LANL in 2006 as a G. T. Seaborg Institute Postdoctoral Fellow. She is active in the Minerals, Metals, and Materials Society (TMS), the Association for Iron and Steel Technology, and the Los Alamos Chapter of ASM International. She received a TMS Young Leader Professional Development Award in 2008 and was the TMS Young Leader International Scholar in 2010.



External Advisory Board

Shown are members of the MSE External Advisory Board (EAB) who met on campus in April. The EAB meets annually with students, faculty, and staff and provides vision and guidance to the department on topics such as curriculum, policies, and accreditation. The photo was taken in the newly remodeled Undergraduate Laboratory and Computational Center.

Front row, left to right: Former MSE Chair Mark Plichta '79; Jim Brusso '92, Engel Metallurgical Ltd.; Sally Klaasen '92; and Greg Olson, Northwestern University; Back row, left to right: Greg Ojard '88, Pratt & Whitney; Paul Prichard '84, Kennametal Inc.; and Joe Nowosad '87, ArcelorMittal.

New Alumni

2012 BS in Materials Science and Engineering Graduates

Front row, left to right: Anthony Tuthill, Samantha Leonard, Dale Goodloe, Trevor Gibson, Ashwin Vekaria, Carol Deming, Sara Heck, Hilary Aho, and Kyle Deane.

Back row, left to right: Michael Wyzlic, Daniel Hein, David MacEwen, Lance Taylor, Nicholas Kraft, Kelsey Waugh, Tyler Botbyl, Aaron Cedergren, and Matthew Gardeski. Not pictured are Henry Durnwald and Michael Pawlicki.

Hilary Aho [1]
Tyler Botbyl
Aaron Cedergren
Kyle Deane
Carol Deming
Jesse Dillon
Henry Durnwald [1]
Matthew Gardeski
Trevor Gibson
Dale Goodloe
Sara Heck
Daniel Hein
Nicholas Kraft
Samantha Leonard
David MacEwen
Michael Pawlicki
Alicia Steele
Lance Taylor [2]
Anthony Tuthill
Ashwin Vekaria
Kelsey Waugh [1]
Michael Wyzlic

Notes: 1 BS in MSE and Biomedical Engineering (BME)
2 BS in MSE and Mechanical Engineering (ME)

2012 Graduate Degrees in Materials Science and Engineering

Student	Advisor	Degree
Zhiyao An	Stephen Kampe	MEng
Matthew Andreise	Jiann-Yang Hwang	MS MSE [a]
Ananyo Bandyopadhyay	Greg Odegard (ME-EM)	PhD MSE
Tianle Cheng	Yu Wang	PhD MSE
Ding Chu	Miguel Levy	PhD MSE
Yan Huo	Yun Hang Hu	PhD MSE
Zhiwei Peng	Jiann-Yang Hwang	PhD MSE
Lei Zheng	Yun Hang Hu	PhD MSE

Note: a Pending

Michigan Tech

Materials Science and Engineering
Minerals and Materials Engineering Building 512
1400 Townsend Drive
Houghton, MI 49931-1295

Alumni at a Glance

- Kenneth Brunk '69 was appointed as Midway Gold Corporation chairman and CEO of the registrant. Ken will continue to serve as president of the registrant.
- Parker Aerospace Group Vice President of Integrity William Schmiege '80, was elected to a two-year term as chairman of America's Aerospace Quality Group (AAQG), which is a cooperative organization committed to achieving significant performance improvements through the development of standards, industry oversight, and guidance materials for use throughout the supply chain.
- Paul Korpi '76 has been named chief operating officer of Marengo Mining Ltd, Perth, Australia, which is developing the Yandera Copper-Molybdenum-Gold Project in Papua, New Guinea.
- Carey Lutheran '10 is working as an application engineer with FLSmidth, an engineering company and supplier of minerals processing equipment in Park City, Utah. In his spare time, he enjoys skiing, camping, fishing, and biking.

- Marcel "Mac" DeGuire '71 has been appointed president and chief operating officer for Guyana Goldfields Inc., based in Toronto.
- Thomas Lograsso '80 '83 '86 has been named interim deputy director of the US Department of Energy's Ames Laboratory, operated by Iowa State University, for a one-year appointment.

Amy Clarke '00 was honored by President Barack Obama with the Presidential Early Career Award for Scientists and Engineers (PECASE). Amy is pictured here just above Obama's right hand. *(See story on page 14.)*

MSE now includes job postings on its website. Prospective employers can now post positions by emailing beth@mtu.edu or ruthie@mtu.edu. This site also gives alumni a resource for changing jobs. Visit www.mtu.edu/materials/department/employment to view current postings.